~~TOP SECRET~~

HANDLE VIA BYEMAN/TALENT
-KEYHOLE CONTROL SYSTEMS
DORIAN



# MOL BACKUP MATERIAL
# FOR
# CONGRESSIONAL HEARINGS

## MANNED ORBITING LABORATORY PROGRAM



DORIAN
HANDLE VIA BYEMAN/TALENT
-KEYHOLE CONTROL SYSTEMS

~~TOP SECRET~~

SAFSL BYE 68259-69

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## PREFACE

Security Caution:

The cover classification of this document has been deliberately obscured to facilitate its handling in less than optimum security environments. The correct classification is TOP SECRET/BYEMAN/ TALENT-KEYHOLE/DORIAN, and it should be safeguarded in accordance with appropriate BYEMAN or TALENT-KEYHOLE security procedures.

All photographic reconnaissance aspects of the MOL system are classified TOP SECRET/BYEMAN/DORIAN information. Additionally, the Eastman Kodak Company, who is developing and producing the camera system, is a covert contractor and can only be associated with the MOL Program under an appropriate BYEMAN classification. (See Section 1).

TOP SECRET/BYEMAN security information is not normally discussed in full Committee sessions. Only a few members of each Committee have been individually briefed in detail on the reconnaissance purpose of MOL (See Section 2).

Purpose and Use:

This document has been assembled as a ready source of MOL information for use by appropriate OSD and AF officials in testimony to Congressional Committees in conjunction with the FY 70 Budget.

This document contains both information and data that can be disseminated under normal DOD security classifications, plus that which is highly sensitive. To assist the user, all UNCLASSIFIED through normal DOD TOP SECRET information is printed on white paper and is classified with black markings. All TOP SECRET/BYEMAN or TALENT-KEYHOLE information is printed on yellow paper and is classified with red markings.

The TOP SECRET/BYEMAN information has been included not for use during Committee Hearings, but rather to insure Prepared Statements or answers to routine questions are consistent with the complete and factual information and also for private discussions with appropriate members of the various Committees and their staffs.

## COMPARTMENTED SECURITY REQUIREMENTS

To successfully accomplish a covert intelligence collection activity, it is essential that sources and methods be protected. Denied area aircraft and satellite reconnaissance programs, as one of our prime intelligence operations, have been placed under extraordinary security controls at direction of the President. The Director of Central Intelligence has been made responsible for specifying and enforcing the necessary controls and procedures to protect this sensitive information. These controls are the BYEMAN and TALENT-KEYHOLE Security Control Systems, both of which are separate and distinct from normal DOD security. Access to these special security systems requires a specific must know determination by appropriate authority and an individual background investigation to establish clearability that exceeds the requirements for TOP SECRET information. All personnel must be specifically briefed on security requirements and all personnel, except members of Congress, must acknowledge their security responsibility in writing.

### BYEMAN SECURITY:

BYEMAN security is designed to provide protection for the concept, design, manufacture, and covert operation of reconnaissance systems. It is applied to that portion of a system that reveals or confirms denied-area reconnaissance capability. Individual access is by specific program which is identified by a BYEMAN codeword compartmentation. PROJECT DORIAN is the MOL Reconnaissance Mission. Project DORIAN access permits the holder access on a must know basis to the following: confirmation of MOL reconnaissance mission, contractors for reconnaissance system and subsystems, contractual details and funding of the covert aspect of MOL, design and application of reconnaissance sensors, targeting information, mission intent and capability, and MOL intelligence community interfaces.

### TALENT-KEYHOLE SECURITY:

TALENT-KEYHOLE security is designed to protect the exploitation and dissemination of the collected intelligence product of NRP activities. Access to TALENT-KEYHOLE is on a need to know basis and it provides access to: existence of the NRO and NRP, an inventory listing of current systems by TALENT-KEYHOLE designator, and the intelligence product.

## DEALINGS WITH CONGRESSIONAL COMMITTEES

NRP clandestine satellite and aircraft overhead reconnaissance programs are handled with the appropriate Congressional Committees in the following manner. The Chairman is briefed on the project and requested to designate the minimum number of Committee and Staff members he feels are necessary to permit the Committee to fulfill its responsibilities. The minimum number recommended to the Chairman normally are the Senior Minority Party Member and the Chief Counsel. As a result, only a few Committee and Staff members are briefed in detail on any such program (for obvious reasons, these informal arrangements with the Chairman are handled very discreetly).

The reconnaissance aspects of MOL are handled in the same manner. The difference, however, is that MOL is an identified line item in the Budget and the NRP projects are not. MOL, therefore, must be discussed and justified during full Committee and Sub-Committee Hearings; the NRP Projects are not discussed except in private sessions with appropriate Committee and Staff members. The difficulty of dealing with MOL during normal Hearings is that the reconnaissance mission and camera equipment are not discussed (the MOL camera was inadvertently briefly described to the Senate Appropriations Military Subcommittee during the FY 69 Budget sessions; this was subsequently covered with appropriate security measures).

Prior to Committee Hearings, a MOL representative (usually, Gen Stewart) discusses program objectives, system characteristics, development status, budget, etc., with MOL-cleared Staff Members and MOL-briefed Committee Members (if desired). During the Hearings, the Chairman, MOL-briefed Committee Members, and Chief Counsel generally endeavor to steer questions and discussions away from the sensitive reconnaissance aspects of MOL. In past years, although sometimes awkward for DOD witnesses, this has worked quite well.

The following page lists the Congressional Committee and Staff Members who are known to have been exposed to information or briefed in detail on the reconnaissance mission of MOL and its camera system.

## MEMBERS OF CONGRESS
## BOTH BRIEFED AND EXPOSED TO THE MOL PROGRAM

### SENATE COMMITTEE ON AERONAUTICAL AND SPACE SCIENCES

| Democrats | Republicans |
|---|---|
| ANDERSON, Clinton P. - Chairman | SMITH, Margaret Chase |
| RUSSELL, Richard B. | |
| SYMINGTON, Stuart | |
| STENNIS, John C. | |
| CANNON, Howard W. | |

**Staff**

GEHRIG, James J.
VOORHEES, Craig
PARKER, William

### SENATE COMMITTEE ON APPROPRIATIONS

| | |
|---|---|
| RUSSELL, Richard B. - Chairman | SMITH, Margaret Chase |
| STENNIS, John C. | YOUNG, Milton R. |
| ELLENDER, Allen J. | ALLOTT, Gordon |
| MANSFIELD, Mike | |

**Staff**

WOODRUFF, William W.
HEWITT, Francis S.
HARTUNG, Edmund L.

### SENATE COMMITTEE ON ARMED SERVICES

| | |
|---|---|
| STENNIS, John C. - Chairman | SMITH, Margaret Chase |
| RUSSELL, Richard B. | THURMOND, Strom |
| SYMINGTON, Stuart | TOWER, John G. |
| CANNON, Howard W. | |
| JACKSON, Henry M. | |

**Staff**

BRASWELL, T. Edward
KENDALL, James T.
GILLEAS, Ben J.
HARPER, Everett L. Col

## HOUSE COMMITTEE ON SCIENCE AND ASTRONAUTICS

| Democrats | Republicans |
|---|---|
| MILLER, George P. - Chairman | |
| TEAGUE, Olin E. | |
| KARTH, Joseph E. | |
| DADDARIO, Emilio Q. | |

Staff

GERARDI, Peter A.

## HOUSE COMMITTEE ON APPROPRIATIONS

| | |
|---|---|
| MAHON, George H. - Chairman | LIPSCOMB, Glenard P. |
| SIKES, Robert L. F. | MINSHALL, William E. |

Staff

MICHAELS, Robert L.
PRESTON, Ralph

## HOUSE COMMITTEE ON ARMED SERVICES

| | |
|---|---|
| RIVERS, L. Mendel - Chairman | BATES, William H. |
| PHILBIN, Philip J. | PIRNIE, Alexander |
| PRICE, Melvin | HALL, Durward G. |
| STRATTON, Samuel S. | WHALEN, Charles W., Jr. |
| ICHORD, Richard | |
| LENNON, Alton | |
| RANDALL, William J. | |

Staff

BLANDFORD, John R.
COOK, William H.
MORGAN, Earl J.

## HOUSE COMMITTEE ON GOVERNMENT OPERATIONS
### Subcommittee on Military Operations

| | |
|---|---|
| HOLIFIELD, Chet - Chairman | HORTON, F. J. |

Staff

ROBACK, Herbert

## MOL PROGRAM OBJECTIVES EXPLANATIONS

### Background

Recent informal discussions with MOL-cleared* House and Senate Committee Staff Members indicate some concern for the forthcoming Hearings regarding the increasing difficulty of justifying MOL to the full Committees without referring to its reconnaissance mission. They recognize the problem of discussing MOL in light of the stringent security measures used to protect knowledge of the fact, extent, and capability of the U.S. covert overhead reconnaissance program (The NRP) but nevertheless feel that stronger MOL justification may be needed this session.

The problem exists because only a limited number of Committee and Staff members are briefed in detail on the MOL reconnaissance mission, and the fact that clandestine overflight of otherwise denied areas for reconnaissance purposes is never discussed during Committee Hearings (See Section 2).

Recognizing, nevertheless, that during the FY 70 Budget Hearings, a Committee or a particular Member may insist on details from a key OSD or AF official, it may become necessary to discuss the MOL camera system/reconnaissance mission with a full Committee. The following three subsections contain increasingly classified levels of information, along with appropriate security safeguards to be taken, which should be discussed if necessary in increasingly difficult situations during Committee Hearings.

* "MOL-Cleared" or "MOL-briefed" in this Section refers to the reconnaissance aspects of MOL.

## MATERIAL SUITABLE FOR USE IN PREPARED STATEMENTS, ANSWERS TO ROUTINE QUESTIONS, ETC.

The following material should be used as appropriate in Prepared Statements, responses to routine questions during full Committee Hearings, etc. (Note: Although initially classified FOR OFFICIAL USE ONLY, CONFIDENTIAL, or SECRET, as appropriate for the entire Statement or Hearing Transcript, the following will subsequently be cleared for inclusion in the public record).

The basic purpose of MOL has remained the same since the President approved the Program in 1965:

1. To develop new defense-related technology and equipment for both manned and unmanned space flight, and to perform new and rewarding experiments with that technology and equipment.

2. To acquire new knowledge on what man is able to do in space related to the defense of America.

Additionally, the following is pertinent:

1. MOL does not carry bombs or weapons of any kind, and in no way abrogates the space treaty or U.S. commitments in that regard.

2. Like most DOD major R&D space projects (VELA; Defense SatCom; TRANSIT; MIDAS; etc.), which unlike ground-based development efforts usually provide an early useful service to the strategic and tactical forces, MOL is also expected to provide a useful Defense support function at the outset. This support function appears to be of such value as to justify the program cost.

3. The MOL and NASA AAP Orbital Workshop are not unnecessarily duplicative. The Workshop cannot accommodate the Defense-related experimental hardware MOL is designed to carry. MOL, on the other hand, could accomplish only a limited number of the Workshop objectives even if the experimental DOD hardware were removed. (See Section 9).

## INCREASED COMMITTEE PRESSURE FOR MORE SPECIFIC MOL MISSION INFORMATION

1. Ask to go "off the record."

2. Caution any non-Committee government Legislative Liaison people present that the following is highly classified, sensitive information -- and no notes are to be taken or subsequent memos written without your approval.

3. Identify MOL as a "surveillance" system which, by virtue of its polar orbit, will have overhead access to the entire world. MOL contains a very-advanced, highly-classified earth sensor designed for operation at orbital altitudes on the order of 70-80 miles. The technical intelligence information obtained is expected to be of great value to DOD force planning and operational employment, and should also be highly valuable in any future Strategic Arms Limitation Agreement that might be reached. . . . Emphasize that MOL is not a bomb-in-orbit. Point out reason for DOD extreme reluctance to admit MOL is a surveillance system is the international "delicacy" of this subject. . . . (Avoid identifying the specific MOL "surveillance" sensor if possible.)

FULL COMMITTEE INSISTS
ON CAMERA SYSTEM/MISSION SPECIFICS

1. Ask Chairman to have a few words in private with him.

2. If this is one of the Armed Services or Appropriations Committees (or Subcommittees), ask the Chairman to somehow divert the line of questioning. If other than an Armed Services or Appropriations Committee or Subcommittees, explain policy of those Committee Chairmen in stringently limiting access and suggest consultation with them prior to any further action.

3. If a decision is nevertheless reached to discuss the subject with the full or designated Committee members, proceed as follows:

a. Request to remain completely "off the record," no notes, etc.

b. Request that the Hearing Room be cleared of everyone except the Committee members, MOL-cleared Committee Staff members, and MOL-cleared DOD witnesses.

c. Request the Chairman to have the Chief Counsel record the names of all present in the room. State that what will be discussed is highly sensitive, should not be discussed outside the Hearing Room, that indiscreet disclosure could have grave repercussions both present and future for U.S. security, etc.

d. Describe the MOL camera in layman-terms as the world's largest, high resolution camera ever to be flown in either an aircraft or a space vehicle. [redacted] DOD plans to fly about two MOL missions per year for technical intelligence on Sino-Soviet strategic and tactical weapons systems, etc. MOL might photograph as many as 2,500 Sino-Soviet targets in a single 30-day mission. . . . Point out this super resolution is not needed for broad National Intelligence Estimates (for example, numbers of ICBM's, missile-firing submarine capability, strategic bombers, etc.) -- but is needed to determine precisely how capable the Sino-Soviet offensive/defense weapon systems are so that U.S. Armed Forces can be equipped, sized, and used accordingly. Note that a 20,000 manhour DDR&E/DIA study effort in 1968 concluded that the value of such info to DOD operations and force structure decisions would be worth a great deal.

e. Finally, at the conclusion of the discussion, repeat the request to not discuss or write about MOL as a reconnaissance vehicle outside this Hearing Room.

## MANNED ORBITING LABORATORY (MOL) SYSTEM DESCRIPTION

The major elements of the 30,000 pound MOL spacecraft consist of the Gemini B ascent re-entry vehicle; a Laboratory Module consisting of both a pressurized compartment and an unpressurized service section housing oxygen, helium, hydrogen, fuel cells, attitude control and auxiliary propulsion systems; and a Mission Module which houses the mission experiments equipment.

The Gemini B, Laboratory Module, and Mission Module will be launched as an integral unit by a Titan IIIM booster into a nominal 80 x 186 nm elliptical orbit. Sufficient expendables will be carried for at least 30 days of on-orbit "shirt-sleeve" operations by the two man MOL crews.

The Titan IIIM is a modified version of the standard Titan IIIC booster. The number of segments in each 120-inch diameter strap-on solid rocket motor is increased from five to seven; the Transtage is removed for increased low altitude performance and higher expansion ratio nozzles are used on the first stage of the core for better performance.

A single pad facility, SLC-6, is being built at Vandenberg AFB to permit safe launches into polar orbits.

On-orbit command and control will be exercised through existing world-wide facilities of the Air Force Satellite Control Facility (SCF). Only minor modifications will be necessary to accommodate MOL, primarily increased computer capacity and the addition of voice communications. Gemini recovery in the Pacific or Atlantic will be accomplished by the portion of the DOD air and sea forces also used for Apollo Program.

Fourteen Air Force, Navy, and Marine graduates of the Air Force Aerospace Research Pilot School are engaged in an extensive training program and are participating as project officers on various components and subsystems in the engineering development phase. The training is similar to that accorded NASA astronauts plus a great deal of specialized training in the experimental military equipment installed in the MOL spacecraft.

## PHOTOGRAPHIC SYSTEM DESCRIPTION

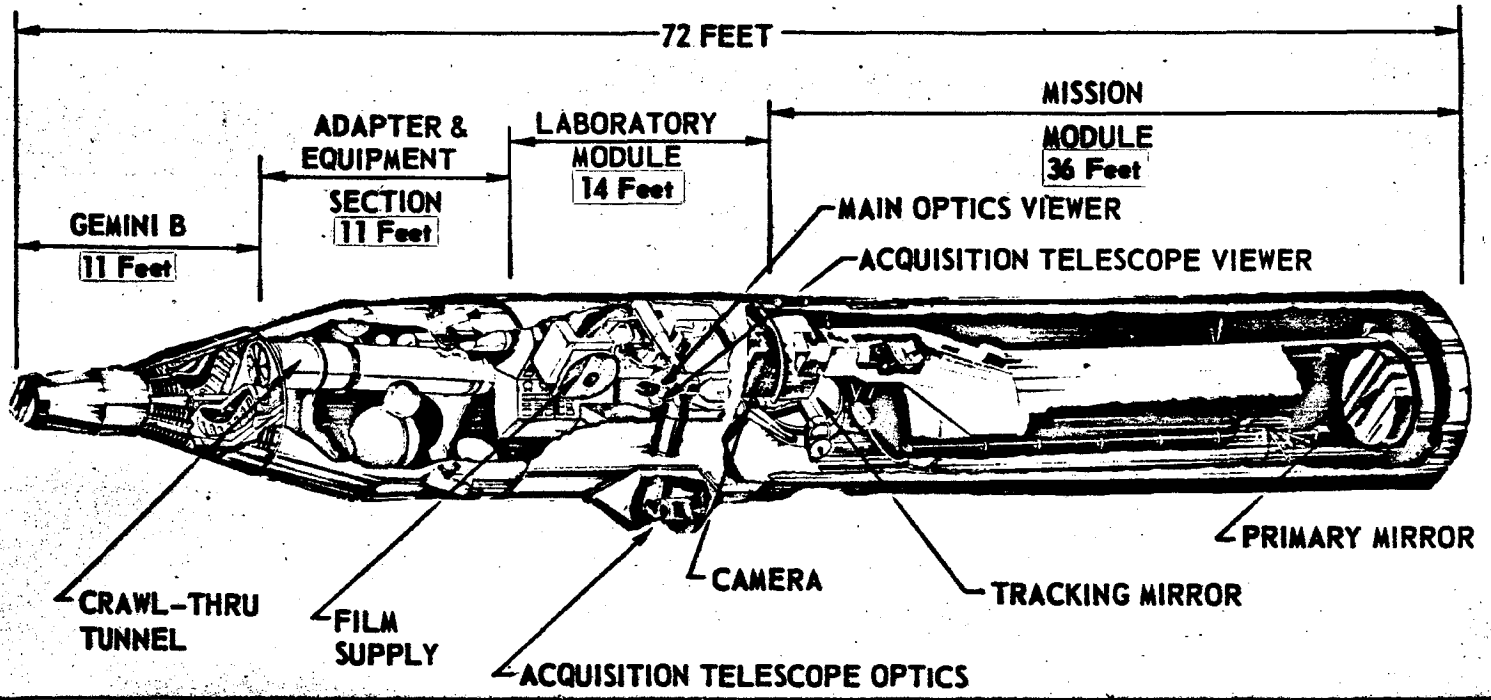
The MOL photographic system consists of a [redacted] focal length ([redacted] Ross-Telephoto lens) frame camera. The ground image will be reflected from the six-foot tracking mirror aft to the six-foot parabolic primary mirror, then forward through diagonal "folding" mirrors and Ross corrector lenses to the camera back, which is in the pressurized laboratory compartment. The circular flat tracking mirror and the circular aspheric primary mirror weigh approximately 1200 pounds each before mounting. The entire photographic system will weigh approximately 6400 pounds, not including film. The baseline configuration system will carry 190 pounds of primary and 50 pounds of secondary film.

As a consequence of the long focal length required to achieve the desired very high resolution, the optical field of view is relatively small (1.1 degrees). This equates to a circle approximately 9,000 feet in diameter, at ground nadir, from an altitude of 80 nm. [redacted] In actual practice, the camera will be operated at various lower and higher altitudes, out to 38° obliquities, and against targets of both higher and lower contrast ratios, and against better and worse than standard atmospheres.

A feature of the flight crew portion of the camera system is the Acquisition & Tracking Scope (ATS). The ATS is a 10" objective, refractive high power telescope which contains the hardware and optical elements which will provide the functions of magnification zoom, image orientation, solar blanking, filtering, focusing, centering, peripheral display and cue insertion. The ATS will enable the astronauts to observe and evaluate targets prior to photography and will assist in the computer controlled pointing and tracking operations. [redacted]

Man, in addition to shortening the operational system development cycle, will improve the performance of the system by peaking system alignments and focus adjustments, by centering targets in the field-of-view of the optics and by controlling mirror tracking rates. He will add to system effectiveness by switching targets to avoid weather and cloud cover, and by noting unusual target activity which provide previously unanticipated intelligence opportunity.

# ORBITING VEHICLE CONFIGURATION




## LABORATORY MODULE

PRESSURIZED ..... 1,000 cu ft
UNPRESSURIZED ..... 500 cu ft

## MISSION MODULE

UNPRESSURIZED ..... 2,800 cu ft

## WEIGHT

GEMINI ..... 6,512 lbs
LAB MISSION MOD ..... 22,790 lbs
29,302 lbs

BOOSTER CAPABILITY ... 31,250 lbs

## PROGRAM CONTENT

On August 25, 1965 President Johnson announced that he was instructing the DOD to proceed with the development of a Manned Orbiting Laboratory (MOL). The President stated that the initial unmanned launch of a fully equipped laboratory was scheduled for 1968. This would be followed later that year by the first of five flights with two-man crews. However, system development did not start immediately, and during the twelve months, subsequent to program approval by the President, MOL activities largely focused on program definition and the selection of major contractors. These were: McDonnell Douglas (Western Division) - Laboratory Module and Experiment Module Structure; McDonnell Douglas Astronautics Company (Eastern Division) - Gemini B Spacecraft; and, General Electric Company - Experiment Integration.

Approval for the initiation of Phase II (Engineering Development) was given on 1 September 1966. By this time, as the result of extensive program definition activities, the technical scope of the program had broadened and a seventh flight had been added to insure accomplishment of all program objectives. The seven flight program consisted of two unmanned Titan IIIM/Gemini B/Laboratory Structure qualification launches followed by five 30-day and longer all-up launches. At that point the first manned launch was scheduled for December 1969. In the interval between September 1966 and February 1969, the program underwent a number of major schedule alterations due to some technical constraints and a series of fiscal year funding limitations. The net effect of these events was to delay the launch of the first manned flight until late CY 71 or early CY 72.

In February 1969, the Secretary of Defense conducted a comprehensive review of the MOL program -- its objectives, current development status, earlier detailed analyses, and its relationship to NASA manned space projects and other DOD space activities. It was determined that the program objectives could probably be accomplished within a six rather than a seven launch program. This conclusion resulted directly from the increased knowledge, experience and maturity of manned spaceflight as demonstrated by the Apollo Program. The distribution of the flights are now two unmanned qualification flights and four 30-day manned flights, with the first manned flight scheduled for early calendar year 1972.

## PROGRAM CONTENT

The President, on August 25, 1965, approved a program consisting of one unmanned qualification flight, one manned qualification flight without a camera system aboard, and four 30-day manned reconnaissance flights.

In September 1966, after contract definition and more complete evaluation of the National need it was decided to conduct a seven instead of a six flight program. The seven flight program comprised the following: two unmanned, partial-system launches (e.g., no prime mission hardware aboard) to qualify the Titan IIIM booster, verify the orbiting vehicle basic structural integrity, and qualify the Gemini B in a sub-orbital ballistic trajectory; three 30-day manned/automatic system missions in fully operational reconnaissance configuration; and two 30-60 day unmanned/automatic system missions in fully operational photographic configuration.

A comprehensive MOL review conducted by the Secretary of Defense, in February 1969, concluded that it was not necessary to fly the MOL unmanned to demonstrate automatic operation of the camera system; that if extended unmanned future operations were desired, the unmanned MOL vehicle (as a minimum modification of the manned vehicle) was not an optimized system; and that the three manned flights alone should generally meet all MOL Program objectives.

Therefore, with the concurrence of the Secretary of the Air Force and the Director of Defense Research and Engineering, further development effort toward the unmanned MOL configuration was deferred until at least FY 72. However, because of fabrication lead time considerations, a fourth manned reconnaissance mission was added to protect, until the FY 72 budget, the option of a continuing very high resolution reconnaissance program in the 1970's if that should prove desirable. In the interim, studies will be conducted that will examine optimized and lower cost unmanned systems using the MOL camera, manned and unmanned operational reconnaissance considerations, and other possible MOL applications and configurations.

The schedule calls for the first manned flight in early CY 1972 and the remaining flights on approximately six month centers thereafter.

## DEVELOPMENT STATUS

Throughout the past year much attention has been given to confirming and improving system safety and reliability. Operational development work is proceeding on MOL and the development, fabrication and testing of major systems and support components is welll along. Hardware for the first three launches (the two unmanned qualification launches plus the first manned flight) is now in fabrication. This summer fabrication will begin on the hardware for the fourth launch (second manned flight). Other milestones completed during the past year and planned for CY 1969 include:

- The sample Pressure Suit Assembly tests were successful, and have shown that mobility, reproducibility and donning characteristics are exceeding expectations.

- The MOL launch abort system simulation program has been successfully completed.

- Feeding System Assembly tests have confirmed the quality and effectiveness of the MOL astronaut feeding system.

- T-IIIM ground and airborne equipment hardware design and fabrication is well along.

- The specification for electrical wiring in the MOL flight vehicle has been changed from Teflon to Kapton material. This change is one product of an MOL Safety Review which was accelerated as a result of the Apollo fire.

- Construction of Space Launch Complex-6, for MOL, will be completed and the installation and check out of Aerospace Ground Equipment will begin.

- Solid Rocket Motor development test firings will begin.

- The Environmental Control and Life Support Test Module will be tested in a space environmental vacuum chamber.

- Development testing of the Mission Module Test Vehicle, which is the first complete test of equipment in the flight configuration, will be initiated.

- The mission development simulator will begin full operation to further the development of mission procedures and time dynamics, and to provide for flight crew training.

## PAYLOAD DEVELOPMENT STATUS

Optical facilities and test chambers at Eastman Kodak continue on schedule including the first use of the Acoustic Chamber by MOL during this year.

Assessment of camera optical performance will continue throughout the year. The manufactured optical quality of the lens system; the accuracy of the tracking mirror drive system; and the induced smear budget arising from system vibration, tracking system errors and related error sources are under constant review to insure meeting optical performance goals. Performance predictions for the camera cystem currently equal or exceed design specifications.

Deliveries of mirrors fabricated from an ultra low coefficient of expinsion (ULE) plastic will continue. Polishing is proceeding satisfactorily with the quality of the optical surfaces approaching or meeting specifications.

Two different Image Velocity Sensor designs are undergoing tests by General Electric. One of the two designs will be selected for the production model during the year.

Two units of the beryllium gimbal (tracking mirror structure) have been delivered to General Electric and are in test. The static load test of the mission module forward section with the gimbal and tracking mirror substitute has been completed. The Dynamic Test and Thermal Test vehicle programs will be completed in CY 1969.

The first Acquisition and Tracking Scope (ATS) unit, known as the Engineering Model, will be delivered by ITEK to General Electric in late 1969. As indicated in a previous section, the ATS is a high power zoom telescope which provides each crewman the capability to observe and evaluate both primary and alternate targets for activity and cloud cover and make positioning corrections to the main optics as required. The ATS incorporated two magnification ranges (16 to 32 power or 63 to 127 power) with the corresponding resolutions 15.3 ft to 11.5 ft., low power range, and 5.7 ft to 3.3 ft for the high power range.

The Mission Development Simulator (MDS) at General Electric will be operating this year. Simulation techniques developed on the MDS will be employed in the MOL simulator at Vandenberg AFB and will assist in the development of on-orbit software and cue material for the astronauts.

## COST/SCHEDULE SUMMARY

Since engineering development began in September 1966, there have been five major development schedule extensions which have caused the first manned launch date to be moved from December 1969 to early 1972, and the total cost to increase from approximately $2 to $3 billion:

(1) In the Spring of 1967, the first manned launch date was changed to December 1970 to permit the development of more advanced experimental hardware and to preclude the need for much higher than available FY 68 funds. The estimated total cost was then approximately $2.35 billion;

(2) In December 1967, recognition of greater than anticipated difficulty in developing the experimental hardware and some shortage of FY 68 funds caused the first manned launch to be rescheduled to August 1971. The estimated total cost was then approximately $2.84 billion.

(3) In June 1968, the reduction of FY 69 funding by $85 million to $515 million (as part of the $3 billion DOD expenditure reduction) caused the first manned launch to be rescheduled to December 1971 with an increase in the estimated total program cost to $2.95 billion.

(4) In December 1968, the planned $600 million NOA for FY 1970 was reduced to $576 million. Shortly thereafter, it became apparent that program requirements were closer to $635-$640 million for FY 1970 if the planned schedule was to be maintained. Therefore, it became evident that it would be necessary to delay the first manned launch into early CY 1972. Estimated total program costs rose to $3.04 billion.

(5) In 1969, the Secretary of Defense reviewed MOL objectives, present status, earlier analysis, relationship to NASA manned space flight programs and other DOD space activities. MOL objectives and the unique value of MOL to National Defense needs were reaffirmed. Progress and increasing maturity in manned space flight led to the conclusion that the program could be reduced from seven to six launches with an estimated total program cost reduction of $200 million and a FY 1970 fund requirement reduction from $576 to $556 million. In late March 1969, a further reduction in FY 1970 NOA to $525 million was affected. This will cause a further delay in the flight schedule to as late as mid CY 1972 and an increase in total program costs to $2.93 billion.

## COST/SCHEDULE SUMMARY

In September 1966, when MOL entered into engineering development, the program included both manned and unmanned reconnaissance missions in a seven launch program (two unmanned qualification launches; three manned; and two unmanned reconnaissance missions). The first manned launch was then projected to take place in December 1969 carrying a qualification/test model of the camera/optical system (expected to produce resolutions [redacted] contractor as a "best possible effort" although his technical judgment regarded it as marginal.

In the Spring of 1967, it became obvious that continuation of system development toward a December 1969 first manned system launch would require at least $150 million more in FY 68 than the $430 million included in the President's Budget Estimate. It was concluded that both FY 68 funding requirements could be reduced and the program would benefit overall by flying a "production" model camera rather than a qual/test model camera on the first manned flight and thus achieve the [redacted] resolution goal at the outset. Therefore, the first manned launch was rescheduled to December 1970; the total cost estimate was increased to $2.35 billion.

In the Fall of 1967, it became apparent that the AF/OSD could not reprogram an additional $50 million NOA needed by the MOL program. At about the same time, it was also recognized that the camera system development would take even longer than anticipated. For these two reasons, the first manned launch was rescheduled to August 1971. It was also decided at this time to increase potential lifetime of the unmanned systems from 33 to 56 days. The combined stretch-out of development, change in unmanned configuration, and better cost-definition caused the estimate of program total cost to increase to $2.84 billion.

In early CY 1969, following an extensive review of the MOL Program by the Secretary of Defense, the value to the DOD of the MOL objective of [redacted] photography was reaffirmed. It was also concluded, for reasons indicated in Section 5-2, that development effort on the unmanned MOL configuration could be deferred at least until FY 71. A fourth manned flight was added to the program to protect, until the FY 72 budget, the option of a continuing very high resolution reconnaissance program. Accordingly, FY 1970 NOA was revised to $576 million and total cost to $2.84 billion without a change in flight schedule. However, the further reduction in FY 1970 NOA to $525 million could delay the first all-up flight to as late as mid CY 1972 and total program cost will increase to $2.93 billion.

## SUMMARY OF MOL FUNDING

(Millions)

| Date | First Manned Launch | FY 67 | FY 68 | FY 69 | FY 70 | To Completion | Total |
|---|---|---|---|---|---|---|---|
| Fall 66 | Dec 69[1] | 286 | 587 | 646 | 344 | 117 | 1,980 |
| June 67 | Dec 70[2] | 288 | 480 | 680 | 541 | 361 | 2,350 |
| Dec 67 | Aug 71 | 292 | 430 | 600 | 600 | 918 | 2,840 |
| Jul 68 | Dec 71 | 292 | 430 | 515 | 600 | 1,110 | 2,947 |
| Dec 68 | Feb 72+ | 292 | 430 | 515 | 576 | 1,225 | 3,038 |
| Mar 69 | Feb 72+ | 292 | 430 | 515 | 556 | 1,042 | 2,835 |
| Mar 69 | Mid 72 | 292 | 430 | 515 | 525 | 1,163 | 2,925 |

1. Qual Model Camera on first manned flight.
2. Production Camera, All-Up Recce Mission on first manned flight.

NOTE: Only the footnotes on this page are classified TOP SECRET/ BYEMAN. If they are removed, classification is CONFIDENTIAL.

## VALUE OF VERY HIGH RESOLUTION PHOTOGRAPHY

Since the inception of the MOL concept as a very high resolution (VHR) photographic reconnaissance satellite, the major issue has been whether or not the increased intelligence information from MOL photography over that achievable with the KH-8 high resolution surveillance satellite system is worth the high cost of the MOL Program.

The Director, CIA, in a May 1968 letter to the Deputy Under Secretary of State, stated that while there was no question about better resolution photography being more helpful, the CIA was unable to find benefits from the MOL Program of sufficient importance to national intelligence to justify the very large cost involved. The Director, CIA suggested that DOD assess the value of VHR photography in its areas of concern.

As a result, in mid-1968, the Director of Defense Research and Engineering convened an Ad Hoc Group of DDR&E, DIA, NRO, and MOL representatives to assess the value of VHR photography. Support and/or consultant services of all DOD intelligence activities, CIA elements, and appropriate contractors were used by the Ad Hoc Group. Studies on scientific and technical intelligence, physical vulnerability, unidentified installations, signature analysis, electronic and other order of battle, SIGINT support, ballistic missile defense penetration, reentry vehicles, camouflage detection, [redacted] arms limitation situations, crisis reconnaissance, etc., were accomplished by the Group.

The Group concluded that VHR imagery would provide much more accurate performance estimates of foreign weapon systems up to several years sooner than could otherwise be obtained. The Group agreed with the CIA that VHR imagery was not too significant for broad national intelligence estimates (e.g., numbers of ICBM's, the possession of missile-firing submarines, the existence of an ABM capability, etc.); however, the Group concluded that VHR imagery would have very great value to DOD in multi-billion dollar force structure decisions and in the deployment/employment of operational forces. The Group also concluded that the value would be very high in any probable future strategic arms limitation agreement situation, and that there were additional benefits (significant, but of lesser value) of the MOL system [redacted] the option of black and white and color film coverage of the same target, crisis reconnaissance, etc.

# MOL/AAP COMPARISON

MOL and the NASA Apollo Applications Orbital Workshop are not duplicative; they are similar only in that they both operate in space in relatively low earth orbit and make use of certain common technologies and hardware components. Under the terms of the Space Act of 1958, the DOD is obligated to investigate and/or operate in space to enhance the security of the United States. That is the single purpose of MOL--to improve the security of the nation. MOL is a major Defense Department effort designed to develop both manned and unmanned space equipment to be used in support of our defense forces, and to learn more about the extent of man's utility in space for defense purposes. AAP is a NASA scientific effort directed toward the goals of advanced space technology and manned orbital operations of extended duration.

In the development of MOL, every practical effort has been made to utilize already developed technology and hardware from NASA and other DOD space programs. Both NASA and DOD have studied each other's equipment and technology on a continuing basis. The most recent review was completed in Fall 1968 as part of DOD/NASA joint economy studies. This study concluded, as have all previous ones, that the NASA Orbital Workshop cannot accommodate the MOL experimental equipment because the Workshop cannot be flown low enough for the prolonged periods required. The study also showed that the MOL, less DOD experimental equipment, could satisfy a number of AAP objectives for flights up to 60 days duration with minimum modifications to the MOL vehicle. Further, the AAP experiments on the Astronomical Telescope Mount (ATM) could also be accommodated with some redesign and repackaging. It was also clear that, without major redesign and high cost, the MOL was not adequate for missions involving rendezvous, resupply, and revisit.

MOL, while drawing heavily on NASA Gemini/Apollo technology and equipments, represents a state-of-the-art spacecraft design which has been tailored to the conduct of advanced military oriented experiments of great complexity. It is the most advanced program in the United States, military or civilian, in the technology which places primary emphasis on the interaction between man and instrumentation.

MOL, while dedicated to military applications, is not a weapons carrier. It is peaceful; it poses no threat to any nation; it is not in violation of any treaty.

From the outset, MOL is expected to perform military support functions, the value of which will fully justify its cost.

## MOL/AAP COMPARISON

The MOL photographic reconnaissance payload cannot be flown in the NASA Orbital Workshop for two major reasons:

1. The Workshop, due to size and configuration, cannot be flown efficiently at the low altitudes required of MOL (perigee as low as 70 nm in the target area) for best performance [redacted] ground resolution) for the prolonged periods required--30 days. The Workshop will be configured to normally operate with perigees of from 150 nm to 200 nm. Under these conditions the best DORIAN camera resolutions would be of the order of [redacted] which would be about the same as the expected performance of the most advanced unmanned system in the current inventory. Therefore, there would be no point in developing or operating the DORIAN system.

2. The orbital inclinations which will be flown in AAP are essentially those flown in Gemini or Apollo earth orbits and the ground tracks do not cover the areas of interest. The MOL payload must be flown in polar orbit to have access to the entire world in order to accomplish the reconnaissance mission. To achieve a polar orbit from Cape Kennedy without overflight of populated areas, would require a major "dog leg" maneuver. Studies show that this higher energy trajectory would require a Saturn V launch vehicle for the Workshop.

## CONGRESSIONAL ENVIRONMENT

### Previous Years

Congress has appropriated precisely money requested for MOL by the President except in FY 1967 when they increased his budget request by $50 million. In FY 1969 the amount requested was reduced by $85 million with DOD concurrence as part of the overall DOD $3.0 billion reduction.

Senate and House Armed Services and Appropriations Committees have generally supported MOL from its inception. However, the ardency of this support has waned with increasing concern over cost, schedule slippage, and the suspected duplication of MOL with AAP on the part of certain Congressmen (which cannot be satisfactorily rebutted in unclassified terms).

The Senate Space Committee has been generally neutral, primarily concerned with duplication of NASA work. However, their interest in MOL has steadily increased as NASA budget requests experienced more difficulty.

The House Science and Astronautics Committee has not requested formal testimony from DOD officials. However, the committee chairman and key staff members have received briefings. The ranking Republican member of this committee, Rep Fulton, has been a constant and vociferous critic of MOL.

Regarding duplication, DOD officials repeatedly have pointed out in testimony that:

- MOL is part of DOD contribution to the National space effort as delineated in the Space Act of 1958;

- MOL objectives are strictly military oriented;

- The MOL configuration represents the most economical use of hardware and technology from both NASA and DOD programs; and was designed specifically to meet MOL objectives. The Orbital Workshop cannot accommodate the MOL experimental hardware.

- There has been close coordination and a free exchange of information technology and hardware between NASA and DOD from the beginning of MOL.

- Any attempt to merge MOL and NASA's Apollo Applications Program would result in a compromise spacecraft unable to satisfactorily meet the objectives of either program; and would prove to be more costly rather than less.

Regarding funding, total cost and schedule slippage:

- Each year, Air Force officials have been asked if the President's budget request is adequate to program needs. The responses have all been negative, but qualified, pointing out that schedule readjustment would be necessary and would not seriously harm the program; but would affect total cost.

- Total program cost estimates given Congress began with $1.5 billion with President's 1965 announcement (the $1.5 billion was an internal DOD approximate estimate prior to any program definition work with contractors), rose to $2.2 billion in FY 68 cycle, then to $2.9 billion in FY 1969. Serious concern over total cost began to appear in the FY 1969 hearings. Reasons given by DOD for increase: better cost estimate after completion of contract definition phase; decision to fly more advanced versions of experiment equipment; schedule stretch-outs due to early technical problems with experimental equipment and inadequate funding.

- Schedule slippage has been attributed by DOD witnesses to: early technical problems with experimental equipment; decision to fly more advanced versions of technical equipment; funding limitations.

Outlook for FY 1970

Greater scrutiny than ever is anticipated this year considering the general mood of Congress concerning defense costs and spending on space programs in general. The MOL Program Office has responded to a request from the Senate Armed Services Committee for a comprehensive funding history of the program including reasons for cost increases.

Again this year, another adjustment in the MOL schedule must be reported as well as a major program change (from seven to six launches) This latter change will probably generate considerable interest. Intense questioning on NASA-DOD duplication is also expected, particularly with regard to any future space program plans, including merger of DOD and NASA projects. There are also indications that the value of MOL in relation to its cost may be seriously questioned. This, of course, will be extremely difficult to answer in full committee sessions.